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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,677	08/29/2003	James E. Boyle	3816.04-D3	2556

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EXAMINER	
OMGBA, ESSAMA	
ART UNIT	**PAPER NUMBER**
3726	

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/652,677	BOYLE ET AL.	
	Examiner	Art Unit	
	Essama Omgba	3726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-10,13-15,17-25 and 27-30* is/are rejected.

7)☒ Claim(s) *2,3,11,26 and 1216* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al. (US Patent 6,056,123) in view of Beyaert et al. (US Patent 6,361,313).

With regards to claims 1 and 10, Niemirowski et al. discloses a support tower for supporting wafers in parallel spaced relationship along a vertical axis and a method of fabricating the support tower, wherein a plurality of slots 5 are cut in each of a plurality of silicon legs 1 to form teeth therebetween, the plurality of silicon legs extending along a vertical axis, and opposite ends of the plurality of silicon legs are joined to respective ones of two silicon bases 2, see column 2, lines 19-21, 26-31, 61-67 and column 2, lines 1-20. Niemirowski et al. does not disclose the teeth being inclined at an angle between 1° and 3° with respect to the vertical axis. However Beyaert et al. teaches such teeth, see column 6, lines 31-35 and figure 4B. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al. with inclined teeth as taught by Beyaert et al., in order to reduce the contact surface between the wafer and the support.

For claim 8, Applicant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

For claim 9, see column 3, lines 6-8 of Niemirowski et al.

3. Claims 4, 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Beyaert et al. as applied to claims 1 and 10 above, and further in view of Ohsawa (US Patent 6,033,215).

For claims 4 and 13, Niemirowski et al./Beyaert et al. discloses a wafer support tower and a method of fabricating a wafer support tower as shown above except for support surfaces extending perpendicularly to the vertical axis being formed on the first sides of the teeth at their distal ends. However Ohsawa teaches such support surfaces, see figure 7. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the teeth of the support tower of Niemirowski et al./Beyaert et al. with support surfaces extending perpendicularly to the vertical axis, in light of the teachings of Ohsawa, in order to securely seat the wafers.

For claim 7, Applicant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Beyaert et al./Ohsawa as applied to claim 4 above, and further in view of Balance et al. (US Patent 6,395,363).

Niemirowski et al./Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces being polished. However it is known to polish substrate support surfaces as attested by Ballance et al., see column 2, lines 66-67 and

column 3, lines 1-11. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have polished the support surfaces of the support tower of Niemirowski et al./Beyaert et al./Ohsawa, in light of the teachings of Ballance et al., in order to reduce the tendency of the support to scratch the substrate surface.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Beyaert et al./Ohsawa as applied to claim 4 above, and further in view of Wingo (US Patent 6,171,400).

Niemirowski et al./Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces supporting the wafers at places located at between 69% and 72% of a radius of the wafers. However it is known to support wafers at such places as attested by Wingo, see column 4, lines 53-58. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have designed the teeth of the support tower of Niemirowski et al./Beyaert et al./Ohsawa such that the wafers are supported at places located at between 69% and 72% of a radius of the wafers, in light of the teachings of Wingo, in order to provide effective support to the wafers.

6. Claims 14, 15, 17-20, 22, 24, 25, 27, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al. in view of Beyaert et al. and Ohsawa.

With regards to claims 14, 15, 19, 20, 24, 25 and 29, Niemirowski et al. discloses a support tower for supporting wafers in parallel spaced relationship along a vertical

axis and a method of fabricating the support tower, wherein a plurality of slots 5 are cut in each of a plurality of silicon legs 1 to form teeth therebetween, the plurality of silicon legs extending along a vertical axis, and opposite ends of the plurality of silicon legs are joined to respective ones of two silicon bases 2, see column 2, lines 19-21, 26-31, 61-67 and column 2, lines 1-20. Niemirowski et al. does not disclose the teeth being inclined at an angle between 1° and 3° with respect to the vertical axis. However Beyaert et al. teaches such teeth, see column 6, lines 31-35 and figure 4B. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al. with inclined teeth as taught by Beyaert et al., in order to reduce the contact surface between the wafer and the support. Although Niemirowski et al./Beyaert et al. does not disclose support surfaces extending perpendicularly to the vertical axis being formed on the first sides of the teeth at their distal ends, however Ohsawa teaches such support surfaces, see figure 7. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the teeth of the support tower of Niemirowski et al./Beyaert et al. with support surfaces extending perpendicularly to the vertical axis, in light of the teachings of Ohsawa, in order to securely seat the wafers.

For claims 17, 18, 27 and 28, Applicant should note that legs formed of quartz or silicon carbide members are old and well known to those of ordinary skill in the art.

For claim 22, Applicant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

7. Claims 21 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Beyaert et al./Ohsawa as applied to claims 14 and 24 above, and further in view of Wingo.

Niemirowski et al./Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces supporting the wafers at places located at between 69% and 72% of a radius of the wafers. However it is known to support wafers at such places as attested by Wingo, see column 4, lines 53-58. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have designed the teeth of the support tower of Niemirowski et al./Beyaert et al./Ohsawa such that the wafers are supported at places located at between 69% and 72% of a radius of the wafers, in light of the teachings of Wingo, in order to provide effective support to the wafers.

8. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Beyaert et al./Ohsawa as applied to claim 13 above, and further in view of Ballance et al.

Niemirowski et al./Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces being polished. However it is known to polish substrate support surfaces as attested by Ballance et al., see column 2, lines 66-67 and column 3, lines 1-11. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have polished the support surfaces of the support tower of Niemirowski et al./Beyaert et al./Ohsawa, in light of the teachings of Ballance et al., in order to reduce the tendency of the support to scratch the substrate

surface. Applicant should note that it is inherent that the portions of the teeth polished in Niemirowski et al./Beyaert et al./Ohsawa/Balance et al. will be the ones in a plane perpendicular to the first axis since it is that portion that support the wafers.

Allowable Subject Matter

9. Claims 2, 3, 11, 12 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

10. Applicant's arguments with respect to claims 1, 4, 7-10, 13-15, 17-20 and 22 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments with respect to claims 5, 6 and 21 have been fully considered but they are not persuasive.

In response to Applicant's argument that the polishing of inclined surface of Balance et al. differs in structure and effect from the polishing of support surfaces extending perpendicularly to the tower axis, the examiner respectfully disagrees. Balance et al. solves the same problem that applicant is trying to solve, i.e. reduce the tendency of the support to scratch the substrate surface. The fact that the plane of the support surface of Balance is not perpendicular to the tower axis does not negate the teachings of polishing the support surface.

In response to Applicant's argument that the very wide range of 25% and 90% of the radius over which Wingo's support rail extends does not render obvious the narrowly claimed range of 69% to 72% of the radius, the examiner respectfully disagrees since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In view of the above remarks, the examiner maintains that a prima facie case of obviousness has been established in the instant application as outlined in the rejections.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Essama Omgba whose telephone number is (571) 272-4532. The examiner can normally be reached on M-F (10-7:30) First Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on (571) 272-4690. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Essama Omgba
Primary Examiner
Art Unit 3726

eo
February 21, 2005